NOAA DIVING PROGRAM

FY 2007 ANNUAL REPORT

The NOAA Diving Program

Diving for Science and Technology

EXECUTIVE SUMMARY

During the year, NOAA divers conducted a wide variety of underwater tasks in support of NOAA's mission to understand and predict changes in the Earth's environment and conserve and manage coastal and marine resources to meet our nation's economic, social, and environmental needs.

Divers from NOAA's National Marine Fisheries Service, National Ocean Service, Office of Oceanic and Atmospheric Research, National Weather Service and Office of Marine and Aviations Operations conducted almost 15,000 dives around the coastal regions and Great Lakes of the United States, including Alaska and the Pacific Islands region. A significant number of dives were conducted in the newly designated Papahanaumokuakea Marine National Monument (PMNM), a 1,500 mile area from Oahu to Midway Island.

Some of the diving activities highlighted in this report include: the removal of 30 tons of derelict marine debris in the PMNM; the installation of a new Coral Reef Early Warning System/Integrated Coral Reef Observation Network in Discovery Bay, Jamaica; the study of invasive Indo-Pacific Lionfish along the southeastern Atlantic coast and harmful algae blooms in the Gulf of Mexico; and the collection of marine specimens for the new aquarium at NOAA's Ted Stevens Memorial Research Institute in Juneau, Alaska.

The NOAA Diving Center (NDC), located at the NOAA Western Regional Center in Seattle, Washington, serves as the administrative headquarters for the NOAA Diving Program and primary facility for all NOAA diver training activities and equipment maintenance and distribution. During the year the NDC conducted nine dive-related training classes, ranging in duration from one to 16 days. Although designed for NOAA employees, all classes are open to other federal, state and local government employees on a space available basis. Additionally, the Diving Medical Officer Course, conducted jointly between NOAA and the Undersea Hyperbaric Medical Society, included attendees from the United States, Mexico, Ireland, Thailand and Singapore.

The NDC also provided hyperbaric chamber supervisors for over 200 days of remote diving operations conducted from the NOAA ship HI'IALAKAI in the Papahanaumokuakea Marine National Monument.

Fortunately, the availability of an experienced chamber supervisor/operator and a state-of-the-art hyperbaric chamber was only needed one time during the year for the treatment of decompression illness (aka 'the bends'). As a result of the treatment, the patient had total resolution of symptoms.

This report highlights the significant achievements of the NOAA Diving Program and the NOAA Diving Center during FY07 and the importance of in-situ work performed by NOAA divers worldwide.

LINE OFFICE DIVING ACTIVITIES

NATIONAL MARINE FISHERIES SERVICE

The National Marine Fisheries Service (NMFS) is dedicated to protecting and preserving the nation's living marine resources through scientific research, fisheries management, enforcement and habitat conservation. During the year, 191 NMFS divers conducted 6,443 dives (Table 1). NMFS divers made scientific dives to support stock assessment, recruitment studies, habitat surveys, specimen collections and field equipment trials. Much of the diving was to install and recover receiver arrays or conduct searches using acoustic tracking gear to monitor the behavioral movements of fish and crustaceans. Most of the diving was in support of coral reef monitoring conducted in the tropical regions in the Florida Keys, the Dry Tortugas, the main Hawaiian Islands, Papahanaumokuakea Marine National

NOAA maritime archaeologist beginning artifact survey at the wreck site of the four-masted schooner Churchill, French Frigate Shoals, Northwestern Hawaiian Islands. (Kelly Gleason/NOAA NMSP)

Monument, Guam, Wake Island and Fiji. The focus of these dives was fish, corals, mollusks, larval plankton, and the impact of invasive species. Some of these surveys were specifically focused on the assessment and evaluation of marine protected areas. A considerable amount of diving was conducted in freshwater in support of salmonid research and habitat restoration. Some of the dives performed involved inspecting fish diversion screens and conducting ship husbandry tasks. Considerable cost-savings were realized by performing these tasks in-house rather than contracting the work to outside vendors. A large-scale diving operation was also conducted in the Papahanaumokuakea Marine National Monument, where divers removed 30 tons of marine debris. This year's diving activities directly and indirectly contributed to the production of more than a dozen peer reviewed research articles and numerous presentations to management bodies.

OCEANIC AND ATMOSPHERIC RESEARCH

The mission of the Office of Oceanic and Atmospheric Research (OAR) is to conduct research, develop products, provide scientific understanding and leadership and conduct outreach towards fostering the evolving environmental and economic mission of NOAA.

OAR divers provide a critical mission support component to scientists, engineers and technicians in the design, testing, deployment, maintenance and retrieval of oceanographic monitoring and data collection instrumentation. This includes the field testing of various underwater mountings, moorings, sensors, sampling equipment and profilers critical to major oceanographic programs. In addition, biological and physical oceanographic data is collected through direct diver measurement and observation. In-situ deployment and recovery of instrumentation, often deployed for a year or more, is conducted as part of normal coastal diving operations. Divers from the Pacific Marine Environmental Laboratory (PMEL) and Atlantic Oceanographic and Meteorological Laboratory (AOML) units provide services on many multi-year scientific programs as a collateral duty to their scientific and administrative assignments. During the year, 11 OAR divers conducted 163 dives (Table 1).

AOML working and scientific divers are the primary support for the installation, maintenance and new instrumentation development of the Coral Reef Early Warning System/Integrated Coral Reef Observation Network (CREWS/ICON). As part of NOAA's Coral Health and Monitoring Program (CHAMP), CREWS/ICON stations provide real-time data used to predict coral bleaching as well as a data transmission link for add-on instrumentation tailored to each remote site. Use of AOML divers and small boats allows non-intrusive installation of instrumentation on sensitive coral reef sites and allows economical deployments without the use of large ships/barges in remote locations. Rapid response diver teams are provided for CREWS/ICON site modifications, repair of storm damages, and instrumentation replacement. In FY07, a new station was installed in Discovery Bay, Jamaica, in a joint operation with the National Undersea Research Center and the University of North Carolina, Wilmington. Subsequently, the station survived Category I hurricane winds of Hurricane Dean and provided valuable oceanographic and meteorological data during the storm passage.

NOS diver sampling mussels from a wreck at 100 fsw in Stellwagen Bank National Marine Sanctuary in the Gulf of Maine. The mussels are analyzed by Food and Drug Administration for the presence of toxic algae to determine whether shellfish is safe to eat (Douglas Costa, SBNMS volunteer diver)

Significant instrumentation evaluation conducted by PMEL divers included the evaluation and field testing of the Platform for Continuous Ocean Observation (PICO), in conjunction with the internationally important Deep-Ocean Assessment and Reporting of Tsunamis (DART) program. As a self-deploying mooring system, PICO is being tested in a variety of configurations that enable remote deployments including high latitude operations in Alaska. Much of the extensive testing of PICO has been conducted in Lake Washington, Seattle, aided by PMEL divers.

NATIONAL OCEAN SERVICE

The National Ocean Service (NOS) is the Nation's principal advocate for coastal and ocean stewardship. NOS divers provide the scientific data necessary for resource managers to make informed decisions to provide for the safe and sustainable use of ocean and coastal marine resources.

Divers working in the National Marine Sanctuary Program (NMSP) conduct diving operations in support of research, resource protection, education/outreach, damage assessment/restoration, regulatory enforcement and submerged cultural resource documentation. These projects are far ranging, from the Florida Keys to the Great Lakes to the remote Northwestern Hawaiian Islands. The mooring buoy programs that have spread throughout the National Marine Sanctuaries have greatly reduced the impact that boat anchors have had on sensitive marine communities. These buoys are installed and maintained by NOS divers and are used by commercial and recreational boaters in lieu of anchoring. Diving also plays an important role in meeting various Memorandums

Table 1 : FY07 NOAA DIVING ACTIVITY

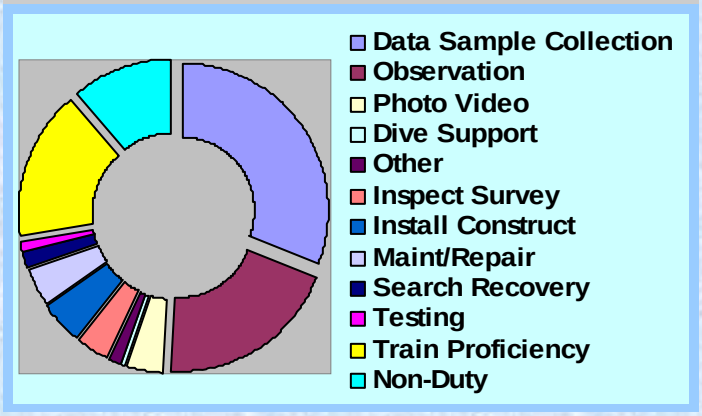
	Divers	*Dives*	*Bottom Time*
OAR	*11*	*163*	*91*
NMFS	*191*	*6685*	*4093*
NOS	*160*	*6091*	*3698*
OMAO	*95*	*1963*	*1072*
TOTALS	***457***	***14902***	***8954***

of Agreement and Federal mandates such as the Maritime Heritage Program (MHP). The MHP's diving operations directly result in fulfilling the core mandates of the Federal Archaeological Program that the NMSP is obligated to follow. The products from these dive operations, including site documentation/drawings, still and video photography, and photo-mosaics aid the Sanctuaries in managing, inventorying and protecting these fragile resources for the American public. Intensive diving operations have taken place in the waters of the Papahanaumokuakea Marine National Monument to perform research and rapid ecological assessments as dictated by Executive Order. Such efforts will aid in developing management strategies for this recently designated marine park.

The National Ocean Service is responsible for providing real-time oceanographic data and other navigation products to promote safe and efficient navigation within U.S. waters. Divers from the Center for Operational Oceanographic Products and Services install and maintain components of the National Water Level Observation Network (NWLON) and the Physical Oceanographic Real Time System (PORTS®). The NWLON is a network of 175 long-term, continuously operating water-level stations throughout the USA, including its island possessions and territories and the Great Lakes. NWLON stations are the foundation for reference stations for NOAA's tide prediction products, and serve as controls in determining tidal datums for all short-term water level stations. PORTS® measures and disseminates observations and predictions of water levels, currents, salinity, and meteorological parameters (e.g., winds, atmospheric pressure, air and water temperatures) that mariners need to navigate safely. In California, divers perform maintenance dives on the West Coast observatories that gather information that is incorporated into the Integrated Ocean Observing System (IOOS). The IOOS is a valuable tool in helping to improve predictions of climate change and weather and their effects on coastal communities. The IOOS also helps to improve the safety and efficiency of maritime operations. Also supporting maritime operations are the NOS Navigation Response Teams. These teams work in small boats performing hydrographic surveys to provide data for updating NOAA nautical charts. Submerged obstructions that are deemed possible hazards to navigation are investigated by NRT divers and least-depth soundings are determined and documented.

NOS divers conducted studies on the invasive Indo-Pacific Lionfish along the southeastern Atlantic coast, as well as on harmful algae blooms in the Gulf of Maine. Mussel and oyster monitoring projects help provide information to the Food and Drug Administration to determine the level of water-born toxins that may affect shellfish industries. An example of NOS divers contributing to the international community is the ongoing training of marine park personnel in Columbia, South America. NOS divers have been very active over the years in teaching scientific diving techniques and applied technologies for marine park management. During FY07, 160 NOS divers performed a total of 5,940 dives (Table 1).

Breakdown of NDP Diving Activities During FY2007



OFFICE OF MARINE AND AVIATION OPERATIONS

The mission of NOAA's Office of Marine and Aviation Operations (OMAO) is to safely and efficiently operate NOAA ships and aircraft, incorporate emerging data acquisition technologies, and provide a specialized professional team responsive to NOAA programs. NOAA fleet diving activities include ship husbandry tasks such as clearing screws and sea strainers, conducting hull surveys for damage, and installing transducers. Fleet divers also support science activities including installing tide gauges, installing and replacing data gathering equipment, and investigating multi-beam contacts. These activities save the NOAA fleet significant time and cost by accomplishing underway repairs, maintenance and tasks to keep operations continuous throughout the year.

During FY07, 95 OMAO divers conducted a total of 1961 dives (Table 1). OMAO divers perform operations in many locales from the South Pacific, Bering Sea, coastal Alaska waters, and Pacific Northwest, to the North and South Atlantic, and Gulf of Mexico. A highlight from each of 19 ships follows:

NOAA Ship ALBATROSS IV supported the US Army Corps of Engineers and Port Office in surveying Great Harbor, Woods Hole, Massachusetts for the proposed dredging and construction of a new pier for NMFS.

NOAA Ship DAVID STARR JORDAN divers removed remotely operated vehicle cables from the ship's screws and rudders.

NOAA Ship DELAWARE II videotaped net sensors during gear testing in support of NMFS scientists and assisted in the repair of pier camels at the NMFS pier in Woods Hole.

NOAA Ship HENRY B. BIGELOW tasks included hull inspections and supporting the US Coast Guard.

NOAA Ship JOHN N. COBB divers collected specimens for the new aquarium at NOAA's Ted Stevens Memorial Research Institute in Juneau, Alaska.

NOAA Ship KA'IMIMOANA's dives serviced the Tropical Atmosphere and Oceans (TAO) buoy array in the mid-Pacific Ocean.

NOAA Ship FAIRWEATHER removed and installed two tide stations and focused on training new divers for this type of work.

All of NOAA Ship GORDON GUNTER's dives involved husbandry, proficiency and diver familiarization. NOAA Ship HI'IALAKAI performed intensive, multi-disciplinary dive operations including reef assessment and monitoring primarily by transect line surveys, investigating wreck sites and towboarding divers with cameras for large-scale fish surveys.

NOAA Ship McARTHUR II divers assisted the Pacific Marine Environmental Laboratory by test deploying and recovering a DART3-ETD buoy. NOAA Ship MILLER FREEMAN divers installed and removed ship transducers and searched for a subsurface oceanographic mooring. NOAA Ship NANCY FOSTER divers conducted two installations/removals of a 300lb. multi-beam instrument. All diving on NOAA Ship OREGON II and NOAA Ship OSCAR DYSON involved ship inspections, husbandry and proficiency. NOAA Ship OSCAR ELTON SETTE divers assisted Bishop Museum on hull inspection dives to determine that hull cleaning was not necessary prior to transiting to the Northwest Hawaiian Islands. This resulted in substantial cost savings. Divers also helped to calibrate an EK60 echosounder in Kealakekua Bay, Hawaii.

NOAA Ship RAINIER performed tide gauge installation and maintenance and conducted nautical charting item investigations and least-depth measurements. NOAA Ship RONALD H. BROWN conducted blue water dives to repair a subsurface current meter. NOAA Ship RUDE and NOAA Ship THOMAS JEFFERSON's divers conducted item investigations that were incorporated into NOAA's Automated Wreck and Obstruction Information System. They also provided sonar calibration support comparing readings with the divers' least-depth gauge.

NOAA DIVING CENTER

The NOAA Diving Center (NDC), located at the NOAA Western Regional Center in Seattle, Washington, serves as the administrative headquarters for the NOAA Diving Program and primary facility for all NOAA diver training activities and equipment maintenance and distribution. Located within the NDC complex are five operational hyperbaric chambers, offices, classrooms, workshops and gear lockers, air compressors and gas storage facilities, and a 30' high x 15' wide, 40,000 gallon water tower for diver training and equipment testing.

One of the primary missions of the NDC is training. Diver training is conducted at the NDC and in Key West, Florida. Dive training programs include Working Diver, Divemaster, Nitrox, and visual cylinder inspection. This year 35 Working Divers and 15 Divemasters were trained and certified by the NDC. An additional 31 scientific divers were certified at the unit level. One Diving Medical Officer Course was held this year and attended by 19 physicians, including four Foreign Nationals from Mexico, Ireland, Thailand and Singapore.

Employees from other Federal, state and municipal agencies frequently enroll in NDC classes on a space-available basis. In FY07, there were nine participants from the following agencies:

Mercer Island Fire (WA)	King County Sheriff
Seattle Harbor Patrol	Seattle Fire Dept.
Snohomish Co. Sheriff	Environmental Protection Agency

EQUIPMENT

The NOAA Diving Center Standardized Equipment Program outfitted 63 new and returning divers, including 18 scientific divers. During the year, 395 regulators were serviced as were 395 Shadow secondary air sources. Due to a persistent quality control problem, the NDC began issuing Oceanic FDX10 regulators in place of the ScubaPro MK25 units. In September, NDC became aware of a voluntary manufacturer's recall of certain batches of the Oceanic regulators. In response, NDC initiated a recall of 200 regulators. The effort to reissue newly serviced regulators is still ongoing.

In January the USCG issued a diving fatality report on the USCG HEALY incident. In response, the NOAA Diving Safety Board reviewed the report to identify any issues that might lead to a similar occurrence within the NOAA Diving Program. As a result, 12 corrective actions were identified and rectified. Actions included conducting dive locker inspections of all NOAA ships by an NDC representative with follow-up reports to the ships' Command, issuance of DUI "weight and trim" systems to all drysuit divers, drafting of a report, "Diving in Special Conditions," and requiring that a topside person be available during all diving operations. NDC also implemented the new equipment policy requiring the use of a BCD with a drysuit. An online training module for this new equipment configuration was developed and placed on the NDP website.

NDC OUTREACH

Personnel from the NOAA Diving Center participated in a variety of outreach activities for NOAA Line Offices, state and local government agencies, educational institutions and the general public. These outreach efforts consisted of technical guidance, operational support and educational services. During FY07, a partial list included:

- participation in NOAA's Science Camp for Kids
- two Congressional delegation visits to NDC
- facility tours for US Army personnel, the American College of Emergency Physicians, Boy Scout troops and local high school students, to name a few
- US Army derelict fishing gear removal training
- EPA training in the use of AGA masks

NDC was represented at a number of diving symposiums and conferences; e.g., DEMA, AAUS annual conference and USCG Dive Program review.

ACKNOWLEDGEMENTS

The activities highlighted in this report represent a small fraction of the operations conducted by NDC and NOAA divers on a daily basis. Diving will continue to play a vital role in helping NOAA accomplish its mission. It is due to the efforts and dedication of these individuals that NOAA continues to be the premiere Federal civilian diving organization in the country. The NDP thanks all divers for their submitted photos, continuing safe practices, hard work and contributions.